USER EQUIPMENT MOBILITY INFORMATION

[0001] The subject matter described herein relates to wireless communications.

BACKGROUND

[0002] A user equipment may determine its degree of mobility. The degree of mobility for a given user equipment may be useful to the network to allow adjusting various values associated with, for example, handover target cell selection, discontinuous reception (DRX) configuration, changing user equipment to an idle state, and the like. For example, a user equipment that is highly mobile may move through a cell at a high rate of speed. This high mobility may impact the service provided to the user equipment with respect to the handover (when the user equipment is in a connected state). To illustrate further with an example, if the network decides to use a target handover cell for a highly mobile user equipment and use the same cell for a less mobile user equipment, the network may command a handover to a cell which no longer serves the highly mobile user equipment. Indeed, these concerns are only exacerbated in so-called heterogeneous networks that include macro cells, picocells, femtocells, or a combination thereof.

SUMMARY

[0003] Methods and apparatus, including computer program products, are provided for mobility information.

[0004] In one aspect there is provided a method. The method may include determining mobility information representative of a mobility of a user equipment during an idle state and a connected state of the user equipment; and sending, when in a connected mode, mobility information to a node of a wireless network.

[0005] In some exemplary embodiments, one of more variations may be made as well as described in the detailed description below and/or as described in the following features. The mobility information may include information representative of a quantity of consecutive state transitions from an idle mode to the connected mode experienced by the user equipment in a current cell. The mobility information may include information representative of a quantity of connection releases by the user equipment in a current cell. The mobility information may include information representative of a quantity of mobility state transitions occurring in a current cell during a time period. The mobility information may include information representative of a count of state transitions in a plurality of cells. The mobility information may include information representative of a traffic pattern at the user equipment.

[0006] The above-noted aspects and features may be implemented in systems, apparatus, methods, and/or articles depending on the desired configuration. The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0007] In the drawings,

[0008] FIG. **1** depicts an example of a system configured to allow a user equipment to provide mobility information to the network, in accordance with some exemplary embodiments;

[0009] FIG. **2** depicts an example of a process configured to allow a user equipment to provide mobility information to the network, in accordance with some exemplary embodiments;

[0010] FIG. **3** depicts an example of an access point, in accordance with some exemplary embodiments; and

[0011] FIG. **4** depicts an example of a radio, in accordance with some exemplary embodiments.

[0012] Like labels are used to refer to same or similar items in the drawings.

DETAILED DESCRIPTION

[0013] To optimize network signalling while judiciously consuming user equipment power, the user equipment may provide information to a network to assist the network in estimating the mobility of the user equipment. This mobility information provided by the user equipment to the network may include information representation of whether the user equipment is mobile and information representative of the degree to which the user equipment is mobile.

[0014] Depending on the mobility activity (e.g., amount of cell changes observed over a given time) of the user equipment, a user equipment in a connected mode to the network can generate a relatively large volume of handover signalling with the network, which may create a significant network signalling load. Moreover, in a heterogeneous network environment (e.g., a HetNet including overlapping small cells and macrocells), the user equipment's mobility including its mobility pattern, history, and the like may impact the network's decision with respect to the selection of which target cell to use for a handover (and the corresponding wireless access point serving that cell) and the corresponding parameters for that target cell/wireless access point after the handover. By having the user equipment provide mobility information (which is representative of the mobility of the user equipment) to the network, the network's configuration of the user equipment may, in some exemplary implementations, be enhanced, when compared to the network estimating the user equipment's mobility based on previous, historical network information (e.g., a list of previous cells and cell types, how long UE stayed in the previous cells) determined from a connected state user equipment, and the like.

[0015] For example, when the data traffic profile of a user equipment is bursty, the user equipment may receive (and/or send) a large number of bursts of data for a short period of time followed by a period with relatively less data transmission. During this less active traffic period, the network has the option to at least choose to keep the user equipment in a connected mode or release the connection, changing thus the user equipment's state to an idle mode. The option selected by the network may depend on input information (e.g., information concerning the user equipment's mobility). If the network determines (e.g., selects) the option of changing the user equipment to an idle mode, the user equipment may remain in an idle mode for a relatively long period of time, when compared to the time spent in connected mode. While in an idle mode, the user equipment may not be configured to provide any information to the network to assist the network in mobility estimation. Having up-to-date mobility information at the network may allow the network to more accurately determine the mobility of the user equipment, and, in some instances, allow the network to, based on up-to-date mobility informa-